Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 16 (4): 1067–1084
https://doi.org/10.15560/16.4.1067

PENSOFT

Avian surveys near Camp Lemonnier and Day Forest, Djibouti, Africa

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Abstract

Two brief biodiversity surveys were conducted near Camp Lemonnier, Djibouti, in May 2014 and February 2016, and to the Day Forest (Forêt du Day) in February 2016. Our complete avian checklist of 143 species, with 96 species preserved as museum specimens is presented here. We document nesting for Spur-winged Lapwing *Vanellus spinosus* (Linnaeus, 1758), the occurrence of Crimson-rumped Waxbill *Estrilda rhodopyga* Sundevall, 1850, and confirm Little Tern *Sternula albifrons* (Pallas, 1764) in Djibouti. We comment on observations for the Critically Endangered Djibouti Spurfowl *Pternistis ochropectus* (Dorst & Jouanin 1952), and the Endangered Egyptian Vulture *Neophron percnopterus* (Linnaeus, 1758), and a previously noted Fringillidae (*Crithagra sp.*) Swainson, 1827 from the Day Forest. Hybridization between Somali Sparrow *Passer castanopterus* Blythi,1885 and House Sparrow *Passer domesticus* (Linnaeus, 1758) is documented with voucher specimens. Although these surveys and taxa lists represent brief inventories for the areas visited, they provide a foundation and reference for future work in this understudied region in the Horn of Africa.

Keywords

Birds, Horn of Africa, museum vouchers, observations.

Academic editor: Michael Mills | Received 14 February 2020 | Accepted 29 April 2020 | Published 26 August 2020

Citation: Dove CJ, Whatton JF, Saucier JR, Schmidt BK, Gotte SW, Klope MW, Rayaleh H (2020) Avian surveys near Camp Lemonnier and Day Forest, Djibouti, Africa. Check List 16 (4): 1067–1084. https://doi.org/10.15560/16.4.1084

Introduction

The Republic of Djibouti is a small country (23,200 km^2) in the Horn of Africa that lies between 10° and 13°N, and 41° and 44°E. Bordered to the west by Ethiopia, to the north by Eritrea, and to the southeast by Somalia (Fig. 1), Djibouti is a relatively young country, gaining independence from France in 1977. The country has 372 km of coastline along the Red Sea and the Gulf of Aden. Djibouti is diverse in landscape for its small size, with vast areas unoccupied by humans. Approximately 884,000 people inhabit Djibouti with more than 75% living in cities, predominantly in Djibouti City (Central Intelligence Agency Factbook, Djibouti: https://www.cia.gov/library/publications/the-world-factbook/geos/dj.html). The majority of the country's land area consists

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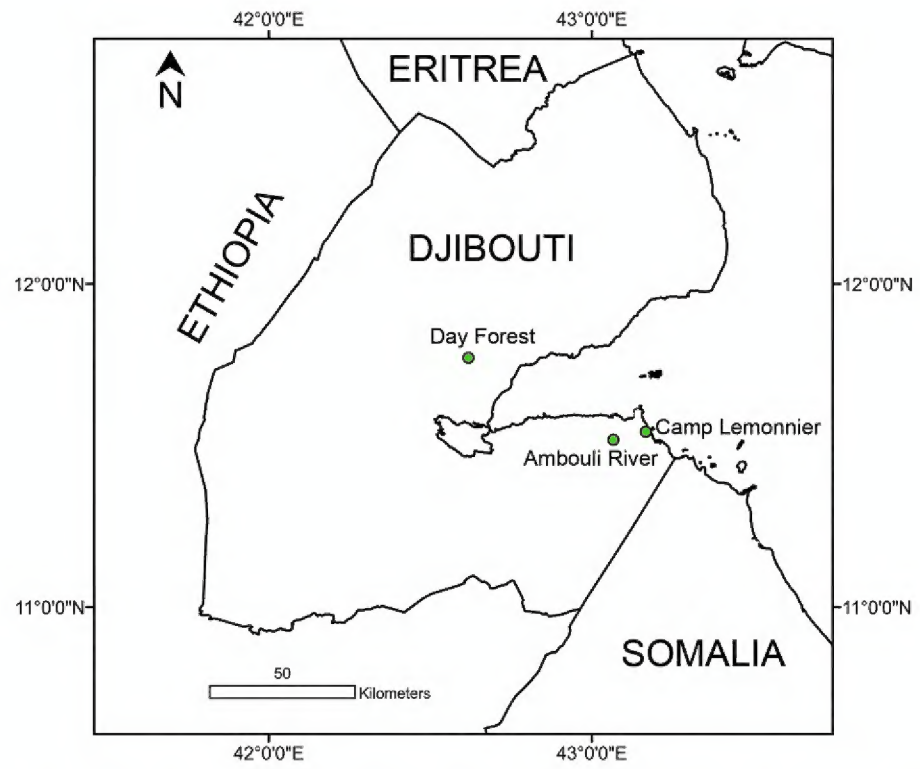

Figure 1. Map of Djibouti showing survey locations (green dots). Additional sight observations were made at Haramous Island and Décan Refuge, near Camp Lemonnier.

of flat gravel plains, plateaus, xeric grasslands, deserts, acacia scrub, high elevation mountain ranges (e.g. Moussa Ail, Goda and Mabla Mountains; over 2,000 m), a low elevation salt lake (Lake Assal; -157 m), rugged volcanic fields, and coastal mangrove areas that create interesting and diverse habitats (Magin 2001). Few detailed or comprehensive biological inventories exist for Djibouti. Bird species are included in Redman et al. (2009, 2011) and Important Bird Areas are covered in Magin (2001). Welch and Welch (1984, 1988) provided species lists and described the autumn bird migration throughout the country. A recent, brief survey by Buechley et al. (2019), and other general bird lists are included in unpublished bird trip reports by Borrow (2010), Redman (2012), and on current searches of eBird (Sullivan et al. 2009) for Djibouti.

The Smithsonian Institution's National Museum of Natural History (NMNH) conducted biological surveys of birds, mammals, herpetofauna, insects and plants in the vicinity of Camp Lemonnier during the spring (30 April–19 May) of 2014 and late winter (1 February–2 March) of 2016, with a short visit made to the Day Forest (Forêt du Day) from 16–21 February 2016 (Fig. 1). Here we include inventories of avian species observed and collected during these expeditions. These surveys, although brief, help document species diversity and provide foundations for more detailed work to inventory biodiversity, properly document species occurrence, and help identify natural areas that have important conservation implications in this rapidly developing country in the Horn of Africa.

Methods

Study sites. Location 1: Camp Lemonnier and Ambouli River (Figs 2–7). Camp Lemonnier (11.54°N, 043.14°E), currently a U.S. military base, is situated within the Djibouti-Ambouli International Airport in the town of Ambouli, 5.5 km southeast of Djibouti City. Birds were observed and some were collected on the more than 200-ha facility (Fig. 2) and adjacent vegetated areas outside the fence line, along the shoreline (Fig. 3), and on the nearby 26-ha Haramous Island (Fig. 4; locally known in English as Turtle Island). In addition, some surveys were conducted in the Ambouli River area near the village of Chabelley located approximately 24 km southeast of Camp Lemonnier, where the small seasonal Ambouli River crosses the road (11.5194°N, 043.0986°E; Figs 5, 6). A single visit to Décan Wildlife Refuge (11.5069°N, 043.1833°E) on 16 May 2014 (Fig. 7) recorded field observations only. Due to the proximity and relative homogeneity of habitats, we combine these areas into one generalized location. Coastal habitat near Camp Lemonnier and Haramous Island consists of inter-tidal mudflats with sparse mangrove patches, mesquite (*Prosopis juliflora*) and *Acacia* scrub. A stream flows from Camp Lemonnier to the Gulf of Aden. This streambed has undergone recent (2016) landscape construction and now forms a larger area of standing fresh water near the southeastern corner of Camp Lemonnier. Many of these habitats were highly disturbed by human and livestock activity, except for Décan Wildlife Refuge where habitat protections and restoration has allowed for taller and more intact stands of *Acacia*. Rocky plateaus and sandy fields are typical habitat types near Ambouli River.

Location 2: Day Forest (Figs 8, 9). Surveys were confined to an area accessible by truck or foot from Campement Touristique de la Forêt du Day, a local overnight facility. Although the Day Forest covers a vast area within

Figures 2–7. General habitat types of study Location 1 near Camp Lemonnier, Djibouti. **2.** *Acacia* scrub within and adjacent to Camp Lemonnier. **3.** Shoreline with sparse mangroves. **4.** Low tide mud flat looking toward Haramous Island. **5** Rocky plateaus and sandy fields near Ambouli River. **6.** Seasonal Ambouli River near village of Chabelley. **7.** Décan Refuge restored habitat.

Figures 8, 9. General habitat types of survey Location 2 (Day Forest). **8.** Declining juniper forest, deep canyons, low growing understory. **9.** Remnants of a building that was previously the governor's house (background) with heavily grazed areas.

the Goda Mountains (Welch and Welch 1984), our short visit focused on a small area (Fig. 8) around the remnants of a building (11.77°N, 042.68°E) that was previously the governor's house (Fig. 9). Rugged nearby areas at higher elevation that were accessible by foot appeared to have denser understory vegetation than lower areas, likely due to difficulty in reaching higher areas for cattle and camel grazing. The Day Forest ranges in altitude from 182–1,783 m (Magin 2001) but we were not able to access the lower more vegetated wadis or spend much time in the highest elevation areas at our location.

Visual surveys (informal) were conducted by all authors with emphasis on and around Camp Lemonnier and Chabelley in Location 1 and the small area within the Day Forest in Location 2. Audio recordings were made (JRS/BKS) on a Marantz® PMD661 recorder with a Sennheiser® ME67 long shotgun microphone and are available from Xeno-canto Foundation (https://www.xeno-canto.org/). The focus on visual documentation was to provide a checklist of species, and therefore abundance of species was based on group consensus. We defined observations as follows: Abundant = multiple individuals observed daily; Common = at least one individual observed daily; Fairly Common = one to five individuals observed weekly; Uncommon = observed fewer than ten times during survey; Rare/Scarce = observed only once during survey.

Because this biodiversity expedition was a rapid survey, collecting of specimens was opportunistic and often subjected to logistical limitations. We followed the guidelines of Fair et al. (2010) for all avian collecting activities. Gender of collected specimens was determined by internal examination at the time of preparation. Tissue samples of collected specimens were preserved in ethanol or 1.25 µL of preservative (20% DMSO, 0.25 µM EDTA, 2% SDS, saturated NaCl). All samples were treated according to United States Department of Agriculture protocol before exportation. Permits and documentation, including Institutional Animal Care and Use Committee (IACUC) approvals are on file in the NMNH Office of the Registrar (Accession numbers 2069879 and 2076337). All specimens were deposited at NMNH (USNM, voucher acronym). DNA barcoding (Hebert et al. 2003) using the mitochondrial marker cytochrome oxidase 1 (COI) was conducted for most avian species collected to verify field identifications and provide additional sequences to the online Barcode of Life Database (http://ww.barcodinglife.org). Sequences for the complete biodiversity project (#396538) can be found on Genbank (https://www.ncbi.nlm.nih.gov/bioproject/396538). We follow the IOC World Bird List for taxonomy and nomenclature (Gill and Donsker 2020) and used Redman et al. (2011) for field identifications. Further identification and comparisons of specimens was conducted at the NMNH.

Results

We recorded a total of 143 species of birds, of which 96 have been preserved as museum specimens. Here we provide our complete avian species list (Tables 1, 2) and include noteworthy observations below for some species of interest and for some collected specimens. Observations from 2014 (spring) and 2016 (winter) are separated in Table 1 to highlight potential seasonal differences in the avifauna. From these two brief surveys, Dove et al. (2017) previously documented the first country record of *Locustella fluviatilis* Wolf, 1810 and noted additional records of uncommon species such as *Caprimulgus inornatus* Heuglin, 1869 and *Ploceus intermedius* Rüppell, 1845.

Anatidae

***Alopochen aegyptiaca* (Linnaeus, 1766)**
Egyptian Goose
Figure 10

Collected material. DJIBOUTI • 1 unknown; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 22 Feb. 2016; NMNH exped.; Genbank: MF580159; USNM 653176.

Identification. This species was easily distinguishable by general coloration and rich brown eye-patches (Fig. 10) and breast spot (Redman et al. 2011).

Remarks. Fairly common to abundant in nearby

Table 1. Birds observed and documented in 2014 (30 April–19 May) and 2016 (1 February–2 March) in Location 1: Camp Lemonier (CL), Ambouli River (AR), and Décan Refuge (DR). Notes on abundance (A = abundant, multiple individuals observed daily, C = common, at least one individual observed daily, FC = fairly common, one to five individuals observed weekly, U = uncommon, observed fewer than ten times during survey, R = rare/scarce, observed only once during survey). Voucher documentation (S = specimen) and breeding (B = breeding evidence or behavior) are provided in the notes columns. Taxonomic names and order follow IOC World Bird List v. 10.1 (Gill and Donsker 2020).

Taxon name	English name	Voucher	2014 location	2014 notes	2016 location	2016 notes
Anatidae						
Alopochen aegyptiaca (Linnaeus, 1766)	Egyptian Goose	S	CL	FC	CL	FC, B
Phasianidae						
Pternistis leucoscepus (Gray, GR, 1867)	Yellow-necked Spurfowl		DR	U	—	—
Phoenicopteridae						
Phoenicopterus roseus Pallas, 1811	Greater Flamingo		CL	U	CL	U
Ciconiidae						
Mycteria ibis (Linnaeus, 1766)	Yellow-billed Stork	S	CL	U	CL	FC
Ciconia abdimii Lichtenstein, 1823	Abdim's Stork	S	CL, DR	C, B	CL	FC, B
Threskiornithidae						
Threskiornis aethiopicus (Latham, 1790)	African Sacred Ibis	S	CL	A	CL	A, B
Platalea leucorodia Linnaeus, 1758	Eurasian Spoonbill		CL	FC	CL	FC
Ardeidae						
Ardeola ralloides (Scopoli, 1769)	Squacco Heron		CL	U	—	—
Bubulcus ibis (Linnaeus, 1758)	Western Cattle Egret	S	CL, AR, DR	FC	CL	C
Butorides striata (Linnaeus, 1758)	Striated Heron	S	CL	FC	CL	FC
Ardea goliath Cretzschmar, 1829	Goliath Heron	S	CL	R	CL	U
Ardea cinerea Linnaeus, 1758	Grey Heron		CL	U	CL	U
Egretta gularis (Bosc, 1792)	Western Reef Heron	S	CL	C	CL	C
Sulidae						
Sula leucogaster (Boddaert, 1783)	Brown Booby		CL	U	—	—
Pelecanidae						
Pelecanus rufescens Gmelin, JF, 1789	Pink-backed Pelican	S	CL	C, B	CL	U
Pandionidae						
Pandion haliaetus (Linnaeus, 1758)	Western Osprey		CL	FC	CL	FC
Accipitridae						
Neophron percnopterus (Linnaeus, 1758)	Egyptian Vulture		CL	U	AR	R
Milvus aegyptiuss (Gmelin, JF, 1788)	Yellow-billed Kite		—	—	CL	R
Burhinidae						
Burhinus capensis (Lichtenstein, 1823)	Spotted Thick-knee	S	CL, DR	U	CL, AR	U
Haematopodidae						
Haematopus ostralegus Linnaeus, 1758	Eurasian Oystercatcher		CL	FC	CL	FC
Dromadidae						
Dromas ardeola Paykull, 1805	Crab-plover	S	CL	A	CL	FC
Recurvirostridae						
Himantopus himantopus (Linnaeus, 1758)	Black-winged Stilt		—	—	CL	FC
Charadriidae						
Charadrius hiaticula Linnaeus, 1758	Common Ringed Plover	S	CL	C — A	CL	C
Charadrius dubius Scopoli, 1786	Little Ringed Plover	S	CL	U	CL	U
Charadrius alexandrinus Linnaeus, 1758	Kentish Plover	S	CL	C	CL	C, B
Charadrius mongolus Pallas, 1776	Lesser Sand Plover	S	CL	A	CL	A
Charadrius leschenaultii Lesson, R, 1826	Greater Sand Plover	S	CL	C	CL	C
Charadrius tricollaris Vieillot,1818	Three-banded Plover	S	—	—	CL	R
Vanellus spinosus (Linnaeus, 1758)	Spur-winged Lapwing	S	CL, DR	A, B	CL	C, B
Pluvialis squatarola (Linnaeus, 1758)	Grey Plover	S	CL	FC	CL	FC
Scolopacidae						
Arenaria interpres (Linnaeus, 1758)	Ruddy Turnstone	S	CL	C — A	CL	C
Calidris pugnax (Linnaeus, 1758)	Ruff		—	—	CL	R
Calidris minuta (Leisler, 1812)	Little Stint	S	CL	A	CL	A
Calidris ferruginea (Pontoppidan, 1763)	Curlew Sandpiper	S	CL	A	CL	C
Calidris alpina (Linnaeus, 1758)	Dunlin		CL	U	CL	U
Calidris alba (Pallas, 1764)	Sanderling	S	CL	C	CL	C
Xenus cinereus (Güldenstädt, 1775)	Terek Sandpiper	S	CL	C	CL	C
Actitis hypoleucos (Linnaeus, 1758)	Common Sandpiper	S	CL	FC	CL	FC
Tringa nebularia (Gunnerus, 1767)	Common Greenshank	S	CL	C	CL	C
Tringa stagnatilis (Bechstein, 1803)	Marsh Sandpiper	S	CL	U	CL	U
Tringa glareola Linnaeus, 1758	Wood Sandpiper	S	—	—	CL	FC
Tringa totanus (Linnaeus, 1758)	Common Redshank	S	CL	FC	CL	FC
Limosa lapponica (Linnaeus, 1758)	Bar-tailed Godwit	S	CL	C	CL	C

Taxon name	English name	Voucher	2014 location	2014 notes	2016 location	2016 notes
Numenius phaeopus (Linnaeus, 1758)	Eurasian Whimbrel	S	CL	U	CL	U
Numenius arquata (Linnaeus, 1758)	Eurasian Curlew	S	CL	FC	CL	FC
Gallinago gallinago (Linnaeus, 1758)	Common Snipe		—	—	CL	U
Laridae						
Ichthyaetus hemprichii (Bruch, 1853)	Sooty Gull	S	CL	C	CL	U
Larus fuscus Linnaeus, 1758	Lesser Black-backed Gull	S	CL	—	CL	FC
Larus (fuscus)heuglini Bree, 1876	Heuglin's Gull		—	—	CL	R
Chroicocephalus genei (Brème, 1839)	Slender-billed Gull	S	CL	—	CL	R
Chroicocephalus ridibundus (Linnaeus, 1766)	Black-headed Gull		—	—	CL	U
Thalasseus bergii (Lichtenstein, 1823)	Greater Crested Tern		CL	U	CL	U
Hydroprogne caspia (Pallas, 1770)	Caspian Tern		CL	FC	CL	FC
Gelochelidon nilotica (Gmelin, JF, 1789)	Gull-billed Tern	S	CL	C	CL	C
Chlidonias leucopterus (Temminck, 1815)	White-winged Tern	S	CL, AR	U	CL	FC
Sterna hirundo Linnaeus, 1758	Common Tern		—	—	CL	U
Sternula albifrons (Pallas, 1764)	Little Tern	S	—	—	CL	FC
Onychoprion anaethetus (Scopoli, 1786)	Bridled Tern	S	CL	U	—	—
Pteroclidae						
Pterocles lichtensteinii Temminck, 1825	Lichtenstein's Sandgrouse	S	CL, AR, DR	C	AR	C
Pterocles exustus Temminck, 1825	Chestnut-bellied Sandgrouse		CL	U	—	—
Columbidae						
Columba livia Gmelin, JF, 1789	Rock Dove	S	CL, AR	A	CL	A, B
Columba guinea Linnaeus, 1758	Speckled Pigeon	S	CL, DR	A	CL, AR	A, B
Oena capensis (Linnaeus, 1766)	Namaqua Dove	S	CL, AR, DR	A	CL, AR	C
Streptopelia roseogrisea (Sundevall, 1857)	African Collared Dove	S	CL, AR, DR	A	CL, AR	FC
Spilopelia senegalensis (Linnaeus, 1766)	Laughing Dove	S	CL, DR	FC	CL, AR	FC
Strigidae						
Otus senegalensis (Swainson, 1837)	African Scops Owl		—	—	CL	R
Bubo cinerascens Guérin-Méneville, 1843	Greyish Eagle-Owl		—	—	AR	R
Caprimulgidae						
Caprimulgus inornatus Heuglin, 1869	Plain Nightjar	S	CL, AR, DR	FC	—	—
Caprimulgus nubicus Lichtenstein, 1823	Nubian Nightjar	S	—	—	CL, AR	C
Caprimulgus europaeus Linnaeus, 1758	European Nightjar		—	—	AR	R
Apodidae						
Apus affinis (Gray, JE, 1830)	Little Swift	S	AR, DR	U	CL, AR	R
Cypsiurus parvus (Lichtenstein, 1823)	African Palm Swift		CL	R	—	—
Meropidae						
Merops persicus Pallas, 1773	Blue-cheeked Bee-eater	S	CL, DR	A	CL	C
Merops albicollis Vieillot, 1817	White-throated Bee-eater	S	CL	C	—	—
Upupidae						
Upupa epops Linnaeus, 1758	Eurasian Hoopoe	S	CL, DR	U	CL, AR	FC
Lybiidae						
Trachyphonus margaritatus (Cretzschmar, 1828)	Yellow-breasted Barbet	S	CL, AR, DR	U	CL, AR	FC
Picidae						
Campethera nubica (Boddaert, 1783)	Nubian Woodpecker	S	—	—	CL	R
Falconidae						
Falco peregrinus Tunstall, 1771	Peregrine Falcon		—	—	CL	R
Falco concolor Temminck, 1825	Sooty Falcon		CL	U	CL	U
Falco tinnunculus Linnaeus, 1758	Common Kestrel		—	—	AR	U
Psittacidae						
Psittacula krameri (Scopoli, 1769)	Rose-ringed Parakeet	S	CL	U	CL	FC
Malaconotidae						
Telophorus cruentus (Hemprich & Ehrenberg, 1828)	Rosy-patched Bushshrike	S	CL, AR, DR	C	CL	C
Laniidae						
Lanius collurio Linnaeus, 1758	Red-backed Shrike	S	CL, AR, DR	A	—	—
Lanius isabellinus Hemprich & Ehrenberg, 1833	Isabelline Shrike	S	AR, DR	U	CL, AR	U
Lanius minor Gmelin, JF, 1788	Lesser Grey Shrike		CL	U	—	—
Lanius excubitor Linnaeus, 1758	Great Grey Shrike	S	CL, AR	FC	CL, AR	FC, B
Corvidae						
Corvus splendens Vieillot, 1817	House Crow	S	CL, AR, DR	A	CL, AR	A
Alaudidae						
Galerida cristata (Linnaeus, 1758)	Crested Lark	S	CL, AR	FC	AR	FC
Eremopterix nigriceps (Gould, 1839)	Black-crowned Sparrow-Lark	S	CL, AR, DR	C	CL, AR	C
Alaemon alaudipes (Desfontaines, 1789)	Greater Hoopoe-Lark	S	CL	U	CL	R
Hirundinidae						
Riparia riparia (Linnaeus, 1758)	Sand Martin	S	CL, AR	FC	CL	U
Hirundo rustica Linnaeus, 1758	Barn Swallow	S	CL, AR, DR	A	CL	A

Taxon name	English name	Voucher	2014 location	2014 notes	2016 location	2016 notes
Pycnonotidae						
Pycnonotus somaliensis Reichenow, 1905	Somali Bulbul	S	CL, AR, DR	A, N	CL, AR	A
Phylloscopidae						
Phylloscopus trochilus (Linnaeus, 1758)	Willow Warbler	S	CL, AR	C	CL	FC
Phylloscopus collybita (Vieillot, 1817)	Common Chiffchaff	S	—	—	CL, DF	C
Acrocephalidae						
Acrocephalus scirpaceus (Hermann, 1804)	Eurasian Reed Warbler	S	CL	U	—	—
Iduna pallida (Hemprich & Ehrenberg, 1833)	Eastern Olivaceous Warbler	S	CL	U	CL	U
Locustellidae						
Locustella fluviatilis (Wolf, 1810)	River Warbler	S	CL	U	CL	U
Cisticolidae						
Prinia gracilis (Lichtenstein 1823)	Graceful Prinia	S	CL, AR, DR	A	CL, AR	A
Prinia rufifrons Rüppell, 1840	Red-fronted Prinia	S	AR, DR	U	CL, AR	FC
Sylviidae						
Sylvia leucomelaena (Hemprich & Ehrenberg, 1833)	Arabian Warbler		CL	R	—	—
Muscicapidae						
Luscinia luscinia (Linnaeus, 1758)	Thrush Nightingale	S	CL	U	—	—
Luscinia megarhynchos Brehm, 1831	Common Nightingale	S	CL	U	—	—
Cercotrichas galactotes (Temminck, 1820)	Rufous-tailed Scrub Robin	S	CL, AR, DR	C, B	CL	FC
Cercotrichas podobe (Müller, 1776)	Black Scrub Robin	S	CL	U	CL	FC
Saxicola rubetra (Linnaeus, 1758)	Whinchat		CL	U	—	—
Oenanthe melanura (Temminck, 1824)	Blackstart	S	CL, AR	C— A	CL, AR	C, B
Oenanthe isabellina (Temminck, 1829)	Isabelline Wheatear	S	—	—	CL, AR	FC
Oenanthe pleschanka (Lepechin, 1770)	Pied Wheatear		—	—	CL	U
Oenanthe scotocerca (Heuglin, 1869)	Brown-tailed Rock Chat		AR	R	—	—
Muscicapa striata (Pallas, 1764)	Spotted Flycatcher	S	CL	C	CL	R
Sturnidae						
Creatophora cinerea (Meuschen, 1787)	Wattled Starling		—	—	CL	R
Nectariniidae						
Cinnyris habessinicus (Hemprich & Ehrenberg, 1828)	Shining Sunbird	S	CL, AR	C, B	CL	C, B
Hedydipna metallica (Lichtenstein, 1823)	Nile Valley Sunbird	S	CL, AR, DR	A	CL, AR	A
Motacillidae						
Motacilla flava Linnaeus, 1758	Western Yellow Wagtail	S	CL, AR	U	CL, AR	C
Motacilla alba Linnaeus, 1758	White Wagtail	S	CL	U	CL, AR	C
Anthus cervinus (Pallas, 1811)	Red-throated Pipit	S	—	—	CL	U
Anthus similis (Jerdon, 1840)	Long-billed Pipit		—	—	AR	R
Anthus campestris (Linnaeus, 1758)	Tawny Pipit	S	—	—	AR	R
Emberizidae						
Emberiza striolata (Lichtenstein, 1823)	Striolated Bunting	S	AR	U	AR	FC
Passeridae						
Passer castanopterus Blyth, 1855	Somali Sparrow	S	CL, DR	A	CL, AR	A
Passer castanopterus × *P. domesticus* (Linnaeus, 1758)	Somali/House Sparrow	S	—	—	CL	FC
Ploceidae						
Ploceus galbula (Rüppell, 1840)	Rüppell's Weaver	S	CL, AR, DR	A, B	CL, AR	A, B
Ploceus intermedius Rüppell, 1845	Lesser Masked Weaver	S	—	—	CL	R
Estrildidae						
Estrilda rhodopyga Sundevall, 1850	Crimson-rumped Waxbill	S	CL	C, B	CL	FC
Lagonosticta senegala (Linnaeus, 1766)	Red-billed Firefinch	S	CL	FC	CL	FC
Euodice cantans (Gmelin, JF, 1789)	African Silverbill	S	CL	U	CL	U

Table 2. Birds observed and documented 16–21 February 2016 in Location 2: Day Forest (DF). Notes on abundance (A = abundant, multiple individuals observed daily, C = common, at least one individual observed daily, FC = fairly common, one to five individuals observed weekly, U = uncommon, observed fewer than ten times during survey, R = rare/scarce, observed only once during survey) and voucher documentation (S = specimen) are provided in the notes column. Taxonomic names and order follow IOC World Bird List v. 10.1 (Gill and Donsker 2020).

Taxon name	English name	Voucher	Notes
Phasianidae			
Pternistis ochropectus (Dorst & Jouanin, 1952)	Djibouti Spurfowl		FC
Coturnix coturnix (Linnaeus, 1758)	Common Quail		R
Accipitridae			
Neophron percnopterus (Linnaeus, 1758)	Egyptian Vulture		FC
Pernis apivorus (Linnaeus, 1758)	European Honey Buzzard		U
Accipiter badius (Gmelin, JF, 1788)	Shikra		R
Aquila fasciata Vieillot, 1822	Bonelli's Eagle		R
Columbidae			
Columba guinea Linnaeus, 1758	Speckled Pigeon		U
Streptopelia roseogrisea (Sundevall, 1857)	African Collared Dove		U
Spilopelia senegalensis (Linnaeus, 1766)	Laughing Dove	S	C
Upupidae			
Upupa epops Linnaeus, 1758	Eurasian Hoopoe		R
Bucerotidae			
Lophoceros hemprichii (Ehrenberg, 1833)	Hemprich's Hornbill		U

Taxon name	English name	Voucher	Notes
Falconidae			
Falco biarmicus Temminck, 1825	Lanner Falcon		R
Malaconotidae			
Laniarius aethiopicus (J.F. Gmelin, 1789)	Ethiopian Boubou		U
Laniidae			
Lanius isabellinus Hemprich & Ehrenberg, 1833	Isabelline Shrike		R
Dicruridae			
Dicrurus adsimilis (Bechstein, 1794)	Fork-tailed Drongo		FC
Corvidae			
Corvus rhipidurus Hartert, 1918	Fan-tailed Raven		C
Hirundinidae			
Ptyonoprogne fuligula (Lichtenstein, 1842)	Rock Martin	S	C
Pycnonotidae			
Pycnonotus somaliensis Reichenow, 1905	Somali Bulbul	S	C
Phylloscopidae			
Phylloscopus collybita (Vieillot, 1817)	Common Chiffchaff	S	A
Phylloscopus umbrovirens (Rüppell, 1840)	Brown Woodland Warbler		U
Sylviidae			
Sylvia atricapilla (Linnaeus, 1758)	Eurasian Blackcap	S	FC
Muscicapidae			
Phoenicurus ochruros (S.G. Gmelin, 1774)	Black Redstart	S	U
Monticola solitarius (Linnaeus, 1758)	Blue Rock Thrush		R
Oenanthe melanura (Temminck, 1824)	Blackstart		R
Oenanthe pleschanka (Lepechin, 1770)	Pied Wheatear		U
Sturnidae			
Onychognathus blythii (Hartlaub, 1859)	Somali Starling		FC
Motacillidae			
Motacilla alba Linnaeus, 1758	White Wagtail		R

Ethiopia and Sudan (Carboneras and Kirwan 2019) and observed in Djibouti in 2014 and 2016. More abundant in 2016 where a nest with eggs and a group of 10 goslings were found on Camp Lemonnier in the south eastern corner adjacent to the shoreline where recent landscape construction was completed.

Phasianidae

***Pternistis ochropectus* (Dorst & Jouanin, 1952)**
Djibouti Spurfowl
Figure 11

Field observations. DJIBOUTI • multiple, unknown; Tadjoura, Day Forest; 11.7707°N, 042.6185°E; 17–20 Feb. 2016; NMNH exped.; understory and cliff edge.

Identification. This grouse-like bird was readily identifiable by the black face and heavily streaked blackish underparts (Redman et al. 2011).

Remarks. This endemic species is listed by IUCN as Critically Endangered (BirdLife International 2018). We observed it daily in the Day Forest scurrying through the understory vegetation and heard its loud 'kak-kak-kack' (McGowan et al. 2019), especially in the morning hours. First detected on 17 February 2016, it was easily located and observed 17–20 February 2016. On 18 February, a villager guided one of us (CJD) to observe this species. On the way up the slope to the plateau from our base location we heard or had fleeting glances of several individual birds. The first bird was heard at 0740 hrs but it was not until just after 0800 hrs that we saw another bird in full view. Three additional birds were flushed on the way to the top of the plateau and all observed individuals were shy and skittish and flew quickly after being seen. At 0900 hrs a single Djibouti Spurfowl (Fig. 11) was heard and emerged from the dense vegetation of *Rumex vesicarius* L. on which it was feeding. After several minutes, the bird flew across the canyon and ducked under the edge of the cliff (1402 m elevation).

Figures 10–15. Birds of Djibouti. **10.** *Alopochen aegyptiaca*. **11.** *Pternistis ochropectus*. **12.** *Mycteria ibis*. **13.** *Pelecanus rufescens*. **14.** *Neophron percnopterus*. **15.** *Dromas ardeola*.

Ciconiidae

***Mycteria ibis* (Linnaeus, 1766)**
Yellow-billed Stork
Figure 12

Collected material. DJIBOUTI • 1 unknown; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 22 Feb. 2016; B. NMNH exped.; Genbank: MF580199; USNM 653158.

Identification. Most observed birds were in breeding plumage (e.g. Fig. 12), as noted by the pink blush coloration on the back and wing-coverts (Redman et al. 2011). Although it is considered a year-round resident in Djibouti and might be an intra-African breeding migrant (Elliot et al. 2020), it is listed as a non-breeding visitor by Redman et al. (2011).

Remarks. Adult birds were observed twice in May 2014, and more often in 2016 when more commonly alone than in pairs. One pair was observed in 2016 on Camp Lemonnier in the southeastern corner where recent landscape construction of the runoff streambed was completed.

***Ciconia abdimii* Lichtenstein, 1823**
Abdim's Stork

Collected material: DJIBOUTI • 1 female; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 10 May 2014; NMNH exped.; nesting on streetlight on base; Genbank: KU722448; USNM 647813.

Identification. This medium-sized stork is recognizable by the glossed purple-green sheen of feathers, small bill, and powder-blue facial skin with red lores and eye-ring (Redman et al. 2011).

Remarks. Observed roosting on tall posts near lookout towers on perimeter of Camp Lemonnier in 2014 and 2016. Noted as a breeding visitor (intra-African migrant) by Redman et al. (2011) to Djibouti and observed in 2014 building a nest on a lamppost on Camp Lemonnier. Often seen transiting across the airfield on Camp Lemonnier. This species is known to commonly occur on airfields and playing fields and is known to nest in around human habitation (Elliot et al. 2019).

Ardeidae

***Bubulcus ibis* (Linnaeus, 1758)**
Cattle Egret

Collected material. DJIBOUTI • 1 male; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 8 Feb. 2014; NMNH exped.; Genbank: KU22471; USNM 647910.

Identification. Identifiable by all white plumage, pale yellow bill, and yellowish-green legs (Redman et al. 2011) in non-breeding plumage.

Remarks. Observations in 2014 included feeding on unidentified species of grasshoppers. One specimen (USNM 647910) collected on 08 February 2014 contained more than 50 grasshoppers (Acrididae) in the stomach. Grasshoppers are listed as one of the main insect food sources by Martinez-Vilalta et al. (2019). Another individual was noted as having pig skin and maggots in the stomach and may indicate that it was feeding at the nearby open garbage dump. It is listed as a non-breeding visitor (Palearctic or intra-African migrant) to Djibouti (Redman et al. 2011).

Pelecanidae

***Pelecanus rufescens* Gmelin, 1789**
Pink-backed Pelican
Figure 13

Collected material. DJIBOUTI • 1 male, Immature; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 5 Feb. 2016; NMNH exped.; freshwater ditch; USNM 653454.

Identification. This species (Fig. 13) was identified in the field as being smaller than Great White Pelican *P. onocrotalus* Linnaeus, 1758 with overall gray appearance and pink bill-pouch (Redman et al. 2011).

Remarks. Commonly seen in 2014 roosting on rock outcrops near Haramous Island but was not observed on Camp Lemonnier until 2016 and likely due to the completion of grading of the runoff stream that created a freshwater pool at the southeastern corner of the base. Immatures and adults were observed singly or in pairs during both surveys. It is listed as a non-breeding visitor to Djibouti (Redman et al. 2011) and is noted as widespread and common on fresh, alkaline, and coastal waters throughout most of the region where it exploits smaller lakes and ponds (Redman et al. 2011).

Accipitridae

***Neophron percnopterus* (Linnaeus, 1758)**
Egyptian Vulture
Figure 14

Field observations. DJIBOUTI • multiple individuals, adult, and immature; Arta Region, Ghoubet Bay; 11.5272°N, 042.5239°E; 11 May 2014; NMNH exped. Several individuals observed on a brief stop-over at this location on the way to Day Forest.

Identification. This species is listed by the IUCN as Endangered (Birdlife International 2015). The adult is easily recognizable as a white or buffy-yellow-and-white vulture with black wing feathers and a bare orange-yellow face. The immature (Fig. 14) is all brown with long feathers on the back of the head and wedge-shaped tail (Redman et al. 2011).

Remarks. On 11 May 2014, we observed this species away from our study locations during a brief stopover at Ghoubet Bay where individuals were picking through trash on the ground among the piles of debris near the beach and were not alarmed by nearby humans. Although not commonly seen at Camp Lemonnier, a single

Figures 16–21. Birds of Djibouti. **16.** *Vanellus spinosus*. **17.** *Vanellus spinosus*, nest. **18.** *Limosa lapponica*. **19.** *Numenius arquata*. **20.** *Sternula albifrons*. **21.** *Lanius collurio*.

individual was observed riding thermals west of the Ambouli River on 11 February 2016 within Location 1. Immatures and adults were commonly observed at the Day Forest 16–19 February 2016 and we therefore agree with Welch and Welch (1984) that this species is abundant in Djibouti, especially near human habitation. Redman et al. (2011) list Egyptian Vulture *Neophron percnopterus* as a resident breeder as well as a non-breeding visitor for Djibouti. McGrady et al. (2014) list this species as one of the most common raptor migrants across the Bab el Mandeb Strait, Djibouti.

Haematopodidae

***Haematopus ostralegus* Linnaeus, 1758**
Eurasian Oystercatcher

Field observations. DJIBOUTI • multiple individuals, unknown; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 2014, 2016; 5 m elevation; NMNH exped.

Identification. A large, distinctive black and white shoreBird with a large bright orange bill and pinkish-orange legs (Redman et al. 2011).

Remarks. This species is one of the nine near threatened bird species in Djibouti (BirdLife International 2019). We observed this species both years as being fairly common at the shoreline near Camp Lemonnier.

Dromadidae

***Dromas ardeola* Paykull, 1805**
Crab-plover
Figure 15

Collected material. DJIBOUTI • 1 female; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 2 May 2014; NMNH exped.; beach; Genbank: KU722475; Xeno-Canto: XC434494 to XC434496; USNM 647842.

Identification. Adult birds are easily identified by the striking black and white plumage (Fig. 15), and immatures by the dark streaking on crown and mantle (Redman et al. 2011).

Remarks. Abundant in May 2014 with large groups gathered just off the shoreline near Camp Lemonnier where tidal fluctuations exposed large mud flats. Much less abundant during the February 2016 survey. A non-breeding visitor to Djibouti (Redman et al. 2011); both adults and immatures were recorded during both surveys.

Charadriidae

***Charadrius tricollaris* Vieillot, 1818**
Three-banded Plover

Collected material. DJIBOUTI • 1 male; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 6 Feb. 2016; NMNH exped.; USNM 653374.

Identification. This plover is easily identifiable in the field by the two black breast band and broad white forehead and supercilium with gray sides of face (Redman et al. 2011).

Remarks. Not seen in 2014 and only noted once in 2016 near the large freshwater pool in the southeastern corner of Camp Lemonnier. This newly created habitat may attract this species that prefers freshwater pools and is regularly found at margins of artificial waterbodies (Wiersma et al. 2019).

***Vanellus spinosus* (Linnaeus, 1758)**
Spur-winged Lapwing
Figures 16, 17

Collected material. DJIBOUTI • 1 male; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 2 May 2014; R. Limm leg.; Genbank: KU722476; XenoCanto: XC 434397, XC434489; USNM 647843.

Identification. Both adult birds, identified by white cheeks and neck (Fig. 16) and black crown, throat, and breast (Redman et al. 2011) were common on and around Camp Lemonnier.

Remarks. A nest of this lapwing was discovered on Camp Lemonnier on 5 May 2014. The four black-spotted, cream-colored eggs (Fig. 17) were in a nest lined with plant material on bare, dry ground that matched the description in Wiersma and Kirwan (2019). This nest was in close association with fresh water as described by Ash and Atkins (2009) for this species. Although listed as a resident breeder in Djibouti (Redman et al. 2011), we are aware of only a few unpublished observations. G. R. Welch and A. Laurent from 1987–1990 (Geoff Welch pers. comm. 2016) noted this species on several occasions throughout Djibouti as establishing territories or being seen paired with territorial display or nest scraping behavior and observed a pair with three small young around the waste water discharge pools along the Doralé-Loyada coast on 7 February 2001. Our photographs (Figs 16, 17) and observations of this nest provides further documentation that Spur-winged Lapwing breeds in Djibouti.

Scolopacidae

***Limosa lapponica* (Linnaeus, 1758)**
Bar-tailed Godwit
Figure 18

Collected material. DJIBOUTI • 1 female; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 8 Feb. 2016; NMNH exped.; sand flats; Genbank: MF580210; USNM 653108.

Identification. Our observations of birds were all in adult non-breeding plumage with pale gray-brown upperparts, gray breast with fine dark streaking and white underparts (Van Gils et al. 2019).

Remarks. Although this species is listed globally as Near Threatened (BirdLife International 2019) it was noted by us as a common migrant on the shoreline near Camp Lemonnier on both trips.

***Numenius arquata* (Linnaeus, 1758)**
Eurasian Curlew
Figure 19

Collected material. DJIBOUTI • 1 male; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 8 Feb. 2016; NMNH exped.; tidal flats/shoreline; Genbank: MF580218; USNM 653274.

Identification. Easily recognizable from Eurasian Whimbrel *Numenius phaeopus* (Linnaeus, 1758) by the longer and more evenly decurved bill (Fig. 19), and unstriped head (Redman et al. 2011).

Remarks. Currently considered near threatened due to declines in several key populations (BirdLife International 2019) but recorded as a fairly common migrant on the shoreline near Camp Lemonnier on both trips.

Laridae

***Ichthyaetus hemprichii* (Bruch, 1853)**
Sooty Gull

Collected material. DJIBOUTI • 1 male; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 12 May 2014; NMNH exped.; tidal shallows; Genbank: KU722451; USNM 647817.

Identification. This gull was identified by being dark brownish-gray above and across the breast with a distinct white hind-collar (Redman et al. 2011).

Remarks. Commonly observed in 2014 on the shoreline near Camp Lemonnier but was uncommon in 2016. It is reported as a resident breeder and common on the coast of Djibouti all year by Redman et. al (2011).

***Sternula albifrons* (Pallas, 1764)**
Little Tern
Figure 20

Collected material. DJIBOUTI • multiple Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 23 Feb. 2016; B. NMNH exped.: Genbank: MF58018; USNM 653161.

Identification. All specimens of small terns collected, observed, and photographed (Fig. 20) on the shoreline of Camp Lemonnier on 13, 22, and 23 February 2016 have been identified as Little Tern according to the most consistent character of the white triangular patch extending over the eye, and other morphological characters reported in Olsen and Larsson (1995). We compared our collected specimens (12) with museum study skins from various subspecific populations of Little Tern at NMNH and found inconsistencies in collected specimens and in museum specimens for characters of concolorous rump and back, and coloration of the brown or black rachis on the outer primaries reported in Gochfeld et al. (2020a, 2020b). Of the six adult male specimens prepared as study skins, four were in breeding plumage, three of these had no bursas (one specimen did not have bursa notes), indicating adulthood. The white triangular patch extends over the eye on each specimen, but none have tail streamers present, and bills of the four breeding adults were yellow with black tip (Olsen and Larsson 1995). Only two specimens (USNM 653161, 653232), one of which is in non-breeding plumage, have

four black outer primaries consistent with descriptions for Saunders's Tern *Sternula saundrsi* A.O. Hume, 1877 (Gochfeld et al. 2020b) but the number of dark outer primaries is inconsistent among our specimens: four specimens have two dark outer primaries, five specimens have three dark outer primaries and two specimens have four dark outer primaries. Two of the adult specimens are in winter/first summer plumage with black bills and feet (Olsen and Larsson 1995) and with the white forehead patch extending beyond the eye as in Little Tern. Molt was noted in various stages in the collected specimens. The concolorous rump, reported as a distinct difference for Saunders's Tern (Gochfeld et. al 2020b) is also inconsistent among our specimens as only three of the collected specimens (USNM 653161, 653318, 653406) have concolorous rump and back. Molecular results (COI) of six sampled specimens (USNM 653157, 653161, 653180, 653182, 653318, 653403) are not reliable. Although all six sequences matched 99.85–100% to known reference sequences (COI) of Little Tern, there are no online sequences available for Saunders's Tern. Furthermore, our sequences also matched 98.60–98.78% to *Sternula nereis* Gould, 1843, which is not likely in Djibouti.

Remarks. Little Tern is listed as a non-breeding visitor with sparse occurrence in Djibouti whereas the very similar Saunders's Tern is considered a resident breeder and fairly common on the coast of Djibouti (Redman et al. 2011). However, due to inconsistency in reported characteristics and in our specimens, all collected specimens were determined to be Little Tern based mainly on the white triangular patch above the eye. Because much inconsistency is noted in museum specimens for rump, primary feather and rachis color, caution is warranted with sight identifications of this species. We believe incorrect sight identifications on eBird (2017), probable lack of tail streamers due to molt at various times of the year, and inconsistent characters among the closely related species has caused the abundance of Saunders's Tern in Djibouti to be overstated. We did not observe any small terns in 2014. More work involving the entire complex of subspecies is needed to confidently identify these terns but our specimens support presence of Little Tern in Djibouti.

***Onychoprion anaethetus* (Scopoli, 1786)**
Bridled Tern

Collected material. DJIBOUTI • 1 female; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 2 May 2014; NMNH exped.; USNM 647919.

Identification. The specimen, an adult female (ovary 5 x 3 mm) bird, was identified by the gray-brown upperparts and narrow white forehead (Redman et al. 2011).

Remarks. One specimen found washed up on the beach on 2 May 2014. It is listed as a breeding visitor by Redman et al. (2011). This species was not observed alive in Djibouti.

Caprimulgidae

***Caprimulgus inornatus* Heuglin 1869**
Plain Nightjar

Collected material. DJIBOUTI • 1 Male; Arta Region, Chabelley Airfield, ca 6 km SW Balbala; 11.5167°N, 043.0667°E; 85 m elevation; 7 May 2014; NMNH exped.; gravel parking lot in sparse arid scrubland; USNM 647811.

Identification. Identified in the field by the lack of white throat patch and lack of nuchal collar (Cleere 2019a).

Remarks. This species, recorded as vagrant in Djibouti (Redman et al. 2011), was observed at Camp Lemonnier, Ambouli River and Décan Refuge. Noted as fairly common, especially at the Ambouli River location, where one male specimen of the sandy-buff morph (Cleere 2019a) was obtained on 7 May 2014 (Dove et al. 2017). Buechley et al. (2019) mist-netted and ringed three close to Djibouti City in September 2017. This species was not observed in 2016.

***Caprimulgus nubicus* Lichtenstein, 1823**
Nubian Nightjar

Collected material. DJIBOUTI • 1 Female; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 23 Feb. 2016; NMNH exped.; open ground near scrub and manmade structures; Genbank: MF580158; USNM 653360.

Identification. Specimens match *C. n. tamaricis* Tristram, 1864 by having greyish upperparts or buffish, thinly streaked blackish-brown, crown heavily streaked; broad tawny-buff nuchal collar; white throat patch; underparts buff barred brown. In the field, males have a large white spot on four outermost primaries and broad white tips to two outermost tail feathers; females have smaller wing and tail spots (Cleere 2019b).

Remarks. This species was not observed in 2014 but was commonly seen in 2016 at Camp Lemonnier and Ambouli River. It is listed as a resident breeder in Djibouti (Redman et al. 2011).

Psittacidae

***Psittacula krameri* (Scopoli, 1769)**
Rose-ringed Parakeet

Collected material. DJIBOUTI • 1 male; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 13 Feb. 2016; NMNH exped.; palms; Genbank: MF580163; USNM 653139.

Identification. Specimens match the description of the resident, non-introduced population of *P. k. parvirostris* (Souancé, 1856) based on the stronger pink collar and all red upper mandible in males (Collar et al. 2019).

Remarks. This species was observed around Camp Lemonnier more often in 2016 but recorded as uncommon in 2014.

Malaconotidae

***Telophorus cruentus* (Hemprich and Ehrenberg, 1828)**
Rosy-patched Bushshrike

Collected material. DJIBOUTI • 1 female; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 8 Feb. 2016; NMNH exped.; open scrubland near coast; Genbank: MF580202; USNM 653272.

Identification. The expected subspecies is *T. c. hilgerti* (Neumann, 1903) based on the geographic location (Fry 2019) but the chin color on specimens is mostly white and the upper belly patches are lighter in pink tone than described for that race in Fry (2019) and as per our comparisons of collections at NMNH. Additionally, male specimens have the forehead and crown light gray-brown tinged with pink as in *T. c. cruentus* (Hemprich and Ehrenberg,1828) and ear-coverts are light pink-tinged gray, grading to whitish towards cheek and throat. Based on this, we assigned specimens to the nominate subspecies, *T. c. cruentus*.

Remarks. Commonly observed during both 2014 and 2016 surveys.

Laniidae

***Lanius collurio* Linnaeus, 1758**
Red-backed Shrike
Figure 21

Collected material. DJIBOUTI • 1 male; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 5 May 2014; NMNH exped.; Prosopis forest with dense riparian undergrowth; Genbank: KU722427; XenoCanto: XC406781; USNM 647790.

Identification. Adult males easily recognizable by the blue-gray crown, black mask, and chestnut mantle and wings (Fig. 21), and black tail with white patches at base (Redman et al. 2011).

Remarks. This species was abundant in 2014 moving through on spring migration but was not recorded during the 2016 survey.

Dicruridae

***Dicrurus adsimilis* (Bechstein 1794)**
Fork-tailed Drongo

Field observations. DJIBOUTI • 1 unknown; Tadjoura, Day Forest; 11.7707°N, 042.6185°E; 19 Feb. 2016; NMNH exped.

Identification. Identified by the all black feathers, deeply forked tail, and red eye (Redman et al. 2011).

Remarks. This species is a known resident breeder in Djibouti (Redman et al. 2011) but was only observed once during the visit to the Day Forest in 2016.

Hirundinidae

***Ptyonoprogne fuligula* (Lichtenstein, 1842)**
Rock Martin

Collected material. DJIBOUTI • 1 female; Tadjoura, Day Forest; 11.7707°N, 042.6185°E; 19 Feb. 2016; NMNH exped.; cliff edge; Genbank: MF580225; USNM 653415.

Identification. Identified by the small white spots in the tail, this small martin was associated with rocks and cliffs (Redman et al. 2011) just in front of the remnants of the governor's house.

Remarks. Commonly observed in Day Forest in February 2016. This species is listed as vagrant in Djibouti (Redman et al. 2011).

Locustellidae

***Locustella fluviatillis* (Wolf, 1810)**
River Warbler

Collected material. DJIBOUTI • 1 male; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 13 May 2014; NMNH exped.; short stature scrub in sand dunes; Genbank: KU722455; USNM 647822.

Identification. The streaked breast and pale-tipped undertail-coverts (Redman et al. 2011) separate this species from the closely related Savi's Warbler *L. luscinioides* (Savi, 1824).

Remarks. One dead specimen was salvaged on 11 May 2014 and another specimen was collected along the shoreline near Camp Lemonnier on 13 May 2014 (Dove et al. 2017). Not observed during the 2016 survey. These specimens represent the first records for this likely passage migrant in Djibouti.

Cisticolidae

***Prinia rufifrons* Rüppell, 1840.**
Red-fronted Prinia

Collected materials. DJIBOUTI • 1 male; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 12 Feb. 2016; NMNH exped.; acacia scrub; Genbank: MF580217; USNM 653133.

Identification. Specimens identified as the nominate *U. r. rufifrons* (Rüppell, 1840) based on geographic location and the rufous color on the forehead only (Redman et al. 2011).

Remarks. This species was observed both years but noted as more common in the areas adjacent to Camp Lemonnier in 2016.

Muscicapidae

***Cercotrichas galactotes* (Temminck, 1820).**
Rufous-tailed Scrub Robin

Collected materials. DJIBOUTI • 1 male; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 5 Feb. 2016; NMNH exped.; acacia scrub; Genbank: MF580191; XenoCanto: XC434393; USNM 653079.

Identification. This species is recognizable by the broadly tipped black tail (Redman et al. 2011). Specimens identified as *C. g. familiaris* (Ménétries, 1832) because they are paler and grayer above, and white below (Collar 2019a).

Remarks. Redman et al. (2011) list this race as common and widespread palearctic migrants and winter visitors and note the species as a resident breeder or non-breeding visitor to Djibouti.

***Cercotrichas podobe* (Statius Müller, 1776)**
Black Scrub Robin

Collected material. DJIBOUTI • 1 female; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 23 Feb. 2016; NMNH exped.; *Acacia/Prosopis* scrub; Genbank: MF580162; USNM 653317.

Identification. Very distinguishable sooty-black bird with long, graduated white-tipped tail (Redman et al. 2011). Specimens identified as *C. podobe podobe* based on the distinct rufous on the inner webs of flight-feathers (Collar 2019b).

Remarks. This species was more common in February 2016 than in May 2014. It is listed as a non-breeding visitor to Djibouti (Redman et al. 2011).

***Oenanthe melanura* (Temminck, 1824)**
Blackstart

Collected material. DJIBOUTI • 1; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 9 May 2014; NMNH exped.; Genbank: KU722444; USNM 647809.

Identification. Identified by the all black tail and pale gray-brown upperparts (Redman et al. 2011). Specimens identified as *O. melanura aussae* (Thesiger & Meynell, 1934) by being darker and grayer than *O. m. lypura* (Hemprich & Ehrenberg, 1833).

Remarks. This species is listed as a resident breeder in Djibouti (Redman et al. 2011) and this was confirmed by observations of family groups in February 2016.

Nectariniidae

***Hedydipna metallica* (Lichtenstein, 1823)**
Nile Valley Sunbird

Collected material. DJIBOUTI • 1 male; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 6 May 2014; NMNH exped.; widely interspersed *Acacia/Prosopis* forest; Genbank: KU722434; XenoCanto: XC406785; USNM 647797.

Figure 22. Three specimens (USNM 653437, 653438, 653398) collected at Camp Lemonnier, Djibouti showing potential hybridization between *Passer c. castanopterus* and *Passer domesticus indicus*.

Identification. Males were easily recognizable by the violet band below the green throat and the extensive violet on lower back, rump, and uppertail-coverts (Redman et al. 2011).

Remarks. This species was the most abundant sunbird observed during both surveys and is a common resident in Djibouti (Redman et al. 2011). Courtship behavior was observed during both surveys.

Passeridae

***Passer castanopterus* Blythi, 1885 × *Passer domesticus* (Linnaeus, 1758)**
Somali–House Sparrow hybrid
Figure 22

Collected material. DJIBOUTI • 1 male; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 14 Feb. 2016; NMNH exped.; USNM 653437.

Identification. Specimens of Somali Sparrow *Passer castanopterus* have been assigned to the nominate race, *P. c. castanopterus* Blyth, 1855 and differ from *P. c. fulgens* Friedmann, 1931 by having paler cheeks and lack strong yellow wash on underparts (Summers-Smith 2019). Specimens also fall within the range of *P. c. castanopterus* which occurs from Djibouti, Somalia, and eastern Ethiopia from approximately 41°E (Summers-Smith 2019). However, at least three specimens (USNM 653437, 653438, 653398) collected in 2016, are potential

hybrids between Somali Sparrow and House Sparrow *Passer domesticus* (Linnaeus, 1758). Comparing adult male specimens to *P. d. indicus* Jardine and Selby, 1831, the race likely present in Djibouti (Gedeon et al. 2015), the distinct gray crown is consistent with *Passer d. indicus* whereas the light yellow wash on the underparts, and the nape and back coloration are consistent with *Passer c. castanopterus* (Summers-Smith et al. 2019). Specimens (Fig. 22) are very similar to the photographs reported to eBird by Kaestner (2015) and by Cohen and Mills (2010). USNM 653437 is a male with wing measurement 70 mm. The gray crown is outlined with chestnut. The back and wing coverts are like Somali Sparrow, but the underparts are much paler that the other two male specimens described here. USNM 653438 is a male with wing measurement 70 mm; the crown is all gray outlined with chestnut and underparts have a light-yellow wash, and the nape and back coloration are consistent with *Passer c. castanopterus*. USNM 653398 is a male specimen with wing measurement 72 mm; the chestnut crown is mottled with gray and the underparts have a light-yellow wash. The back and wing coverts are like Somali Sparrow. Hybridization identification of female specimens was not attempted.

Remarks. House Sparrow is known from Djibouti (Ash and Atkins 2009) and has been present there since 1999 (Gedeon et al. 2015). The subspecies in Djibouti, *P. d. indicus*, is thought to have originated from the Red Sea coast of Arabia (Jennings 2010) and Somalia (Ash and Miskell 1998). *P. d. indicus* has been reported to hybridize with Somali Sparrow in Somalia (Ash and Colston 1981, Ash and Miskell 1998, Borrow 2010). Borrow (2010), Cohen and Mils (2010), Redman (2012), Caratão (2018), and Moreiro (2018) have reported possible hybrids in Djibouti on birding websites and to eBird but specimens obtained on these surveys are the first known specimen records of possible hybridization in Djibouti. More study, including genetic analysis and additional voucher specimens, will confirm hybridization between Somali and House Sparrow in Djibouti.

Ploceidae

***Ploceus galbula* Rüppell, 1840**
Rüppell's Weaver

Collected material. DJIBOUTI • 1 male; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 6 May 2014; NMNH exped.; Genbank: KU722483; XenoCanto: XC406784, XC406788, XC406789, XC406796, XC406797; USNM 647853.

Identification. Breeding males are easily recognizable by the chestnut mask extending across the forehead and the orange-red eyes (Redman et al. 2011).

Remarks. This species was abundant both years, sometimes in large flocks throughout Location 1. Two nests were collected on 9 May 2014 from a communal nesting tree located on the edge of the Ambouli River, Arta

Figures 23, 24. Birds of Djibouti. **23.** *Estrilda rhodopyga*. **24.** *Crithagra* sp.

Region. It is listed as common to locally abundant in Djibouti (Redman et al. 2011).

***Ploceus intermedius* Rüppell, 1845**
Lesser Masked Weaver

Collected material. DJIBOUTI • 1 male; Djibouti Region, Djibouti, ca 5.5 km SE, Camp Lemonnier; 11.5417°N, 043.1667°E; 5 m elevation; 5 Feb. 2016; NMNH exped.; open *Acacia/Prosopis* scrub; USNM 653247.

Identification. Breeding males identified in the field by the creamy-white eyes and pale blue-gray legs (Redman et al. 2011).

Remarks. First reported from a single specimen obtained on 5 Feburary 2016 (Dove et al. 2017), a pair has since been reported nestbuilding near As Eyla, Dikhil Province in 2017 (Buechley et al. 2019).

Estrildidae

***Estrilda rhodopyga* Sundevail, 1850**
Crimson-rumped Waxbill
Figure 23

Collected material. DJIBOUTI • 1 male; Djibouti Region, Camp Lemonnier, ca 5.5 km SE Djibouti; 11.5417°N, 043.1667°E; 5 m elevation; 13 May 2014; NMNH exped.; riparian sedge; Genbank: KU722456; XenoCanto: XC434396, XC434399, XC434488, XC434493; USNM 647824.

Identification. This waxbill easily identified by the red streak through the eye, crimson rump, and red edges to wing coverts (Fig. 23) (Redman et al. 2011).

Remarks. Specimens of Crimson-rumped Waxbill were collected, observed, or photographed at Camp Lemonnier on 4, 5, 7, 13–14 May in 2014, and 9, 12, and 15 February 2016. Three of the collected specimens were juveniles with bursas present (noted at necropsy) and adult birds (some males with testes measurements as large as 4 × 3 mm) were obtained on both trips. This species breeds in September and May in Uganda, and March, April, and July in Kenya (Payne 2019). Specimens belong to the nominate race based on descriptions in Redman et al. (2011) and the lack of the crimson under tail coverts of *Estrilda rhodopyga centralis* Kothe, 1922 (Payne 2019). Crimson-rumped Waxbill is listed as a vagrant (a species outside the normal range that is a very irregular occurrence) by Redman et. al (2011) and not included in Payne (2019) for Djibouti but we observed small groups in the tall sedges along the outflow canal from Camp Lemonnier during both surveys. These observations and specimens of this species support a change in the status of this species in Djibouti.

Discussion

The Smithsonian Institution has not conducted biological surveys in Djibouti since the 1911–12 Child's Frick Expedition to Africa. Edgar Mearns was part of this expedition and spent two days (November 25–26) in Djibouti on his way to "Dire Daoua" (Dire Dawa) Ethiopia in 1911. According to his notes and catalogues (Smithsonian Institution Archives 2018), he collected fewer than a dozen species of birds on his short visit to Djibouti (French Somaliland), but he observed bustards and other birds that we did not record on our recent expeditions.

Parts of Djibouti are being rapidly developed for strategic global port transport and military operations (Paris 2019) and as such, faces huge environmental challenges. The beaches and shoreline near Camp Lemonnier are heavily littered with old tires, plastics, and other trash that washes ashore and the area is frequented by local Djiboutian camel and goat herders. Most of the 200 ha within Camp Lemonnier is barren desert landscape that is rapidly being developed along with adjacent areas that are now mainly covered with *Acacia/Prosopis* scrub. Post-construction landscaping at the southeastern corner of Camp Lemonnier created a large holding area of fresh water inside the facility fence that serves as a safe feeding and resting place for many species of birds. This area attracted many more species of birds in 2016 than observed there in 2014. The Ambouli River wadi near the small village of Chabelley area is heavily used by locals for crafting cobblestones from the nearby rocks that are sold as pavers. Much of the road from Camp Lemonnier to the village of Chabelley was under construction in 2016 by the Chinese Government as part of a new infrastructure project.

The Day Forest, one of the few Afromontane areas in Djibouti, is designated as a protected area by the Djiboutian Government. Although heavy grazing was observed in the area of our survey, inaccessible wadis and cervices in the Day Forest may be refuges for wildlife. The endemic Djibouti Spurfowl lives in Day Forest and is in danger of extinction due to loss of habitat from timber harvest, over grazing and widespread death of the native junipers in these high elevation forests (Fisher et al. 2009). The global populations size was estimated as 285–705 individuals (Fisher et al. 2009). Our frequent encounters with sounds or sightings of Djibouti Spurfowl in the Day Forest gives hope that this species can survive with future management and conservation efforts. Although we observed many signs of cattle and camel grazing at higher elevations near where this bird was observed, we did not have trouble locating this species. Mammalogists on this expedition collected one specimen of Abyssinian Genet *Genetta abyssinica* Rüppell, 1835 (Ferguson et al. 2018) in Day Forest, a likely predator of the Djibouti Spurfowl (McGowan et al. 2019).

A species of Fringillidae persists in the Day Forest and was observed in 2016. This bird was located (no specimen collected) on several occasions in February 2016, photographed (Fig. 24), and voice was recorded very near the location noted in Mills and Cohen (2015) at the remnants of the old governor's house 11.7544° N; 42.6517°E; elevation 1457 m. The individuals appeared similar to the Yellow-rumped Seedeater *Crithagra xanthopygia* (Rüppell, 1840) but had a light-yellow throat patch instead of white and other characteristics similar to those described by Mills and Cohen (2015). We observed a few individuals singing from the tops of trees (> 9 m) but they rarely came down below 3 m and none were captured even though the canopy net was within the flight path between perches. This fringillid (*Crithagra* sp.), with a faint yellowish throat, has been very well described by Mills and Cohen (2015). Edgar Mearns collected a series of *Crithagra* (formerly included in the genus *Serinus*) seedeaters from Ethiopia in 1912 during the Childs Frick Abyssinian Expedition and specimens are in the NMNH collections. Three of the specimens from that expedition (USNM 246634, 246635, 24658), collected near Sidamo or Bodessa, Ethiopia, are labeled as Reichenow's Seedeater *Serinus reichenowi* (now considered *Crithagra reichenowi* (Salvadori 1888)) but another specimen (USNM 246632), collected in Ethiopia (Gamo Gofa), Gato River near Gardula at 4000 feet [1220 m], was labeled by Mearns as *Crithagra xanthopygia*. Examination of this specimen did not reveal any significant characters to separate it from other specimens in the series and was presumably identified based on geographic location. All these previously collected specimens appear smaller overall in size than the birds observed in Day Forest. We only observed adult birds during our visit to Day Forest but Clement (2019) describes juveniles of Yellow-rumped Seedeater as sometimes having a yellowish throat patch, adding to

the complexity of the identification of this species in the Day Forest. Yellow-rumped Seedeater is reported from Djibouti (Redman et al. 2011) and is thought to commonly occur in the Goda and Mahla mountains (Houssein Rayaleh pers. comm. 2019) whereas Reichenow's Seedeater is questionable in Djibouti (Redman et al. 2011). We agree with Mills and Cohen (2015) that it is impossible to assign the Djibouti birds to one taxon and further study of this species complex is needed to determine the taxonomic status of this seedeater in the Day Forest, or other locations in Djibouti.

Recently reported new avian records by Hering et al. (2015), Dove et al. (2017), and Buechley et al. (2019) indicate that more survey work is greatly needed throughout the country to document and describe the avifauna of Djibouti more thoroughly. While the avian surveys presented here are limited, they provide a glimpse of the biodiversity of Djibouti. Describing and documenting wildlife, including urban and invasive species of the country, will serve for better planning and development in the future.

Acknowledgements

Smithsonian expeditions were co-funded through the Global Genome Initiative of the NMNH, Smithsonian Institution (2014) and the U.S. Navy, Natural Resources Program (2016). Camp Lemonnier Environmental Program Directors Kirk Stevenson and Laura Muhs initiated these biodiversity surveys. We thank the US Navy, US Army and US Air Force personnel, especially Tim Adams and Diana L. Graves-Klaric and armory staff at Camp Lemonnier for contributing and assisting with this project. Special thanks are extended to the US Embassy, Djibouti: Julia Stufft, Channa Cumings, Emily Stoll, Tyler Joyner, and Timothy Novak. Abdi Mahamoud (U.S. Embassy liaison, Djibouti) planned our visits for the Day Forest. The Association Djibouti Nature, BirdLife in Djibouti provided the Smithsonian Team useful guidance. We wish to acknowledge technical support from the Smithsonian Institution's DNA Barcode Network and the use of facilities at the Laboratories of Analytical Biology, NMNH, Smithsonian Institution. This project was ultimately successful because of the support and guidance provided by Mr Houssein Rirache Robleh, Director of Environmental and Sustainable Development Department, Ministry of Housing, Urban Affairs and Environment, Djibouti who facilitated permit requests and coordinated the trip to the Day Forest. We appreciate the hard work and enthusiasm of our Djibouti Field Assistants, Abdourahman Ismael and Yahya Moumine (University of Djibouti), and Ms. Adwa Ali and Ali Merito Ali (Centre d'Études et de Recherche de Djibouti–CERD/Djibouti Study and Research Center).

Authors' Contributions

CJD and MWK designed the study; CJD, JFW, JRS, BKS, MWK, SWG collected the data; HR facilitated the work in Djibouti; CJD wrote the manuscript; JRS and BKS created the tables, BKS created the map. CJD, BKS, JFW, SWG provided photographs.

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